

CLAIMS

What is claimed is:

1. A method of operating a temperature control unit, the temperature control unit including a refrigeration circuit housing a refrigerant and having a compressor, a condenser, and an evaporator coil, the method comprising:
  - providing a first flow path extending through the compressor, the condenser, and the evaporator;
  - providing a second flow path extending through the compressor and the evaporator, the second flow path bypassing a section of the refrigeration circuit;
  - directing refrigerant through the first flow path during operation in a cooling mode;
  - directing refrigerant through the second flow path during operation in a heating mode; and
  - recovering refrigerant from the section of the refrigeration circuit during operation in a recovery cycle.
2. The method of claim 1, wherein the section of the refrigeration circuit includes the condenser.
3. The method of claim 1, wherein the refrigeration circuit includes a receiver tank, and wherein recovering refrigerant from the section of the refrigeration circuit during operation in the recovery cycle includes directing refrigerant through the first flow path to increase pressure in the receiver tank.
4. The method of claim 1, wherein recovering refrigerant from the section of the refrigeration circuit during operation in the recovery cycle includes interrupting the flow of refrigerant through the second flow path and directing refrigerant through the first flow path.

5. The method of claim 1, wherein the temperature control unit defines an air inlet and an air outlet and the method further comprises:

- providing an efficiency range;
- measuring an air inlet temperature;
- 5 measuring an air outlet temperature;
- calculating a temperature change between the air inlet temperature and the air outlet temperature; and
- initiating the recovery cycle when the temperature change is outside the efficiency range.

10

6. A method of operating a temperature control unit, the temperature control unit defining an air inlet and an air outlet and including a refrigeration circuit enclosing a refrigerant and having a compressor, a condenser, and an evaporator coil positioned between the air inlet and the air outlet, the method comprising:

- 15 providing an efficiency range;
- providing a first flow path extending through the compressor, the condenser, and the evaporator;
- providing a second flow path extending through the compressor and the evaporator, the second flow path bypassing a section of the refrigeration circuit;
- 20 measuring an air inlet temperature;
- measuring an air outlet temperature;
- calculating a temperature change between the air inlet temperature and the air outlet temperature; and
- initiating a recovery cycle when the temperature change is outside the efficiency range, the recovery cycle removing substantially all of the refrigerant from the section of the refrigeration circuit.

25

7. The method of claim 6, further comprising directing refrigerant through the first flow path during operation in a cooling mode, and directing refrigerant through the second flow path during operation in a heating mode.

30

8. The method of claim 6, wherein the section of the refrigeration circuit includes the condenser.

9. The method of claim 6, wherein the refrigeration circuit includes a receiver tank, and wherein recovering refrigerant from the section of the refrigeration circuit during operation in the recovery cycle includes directing refrigerant through the first flow path to increase the pressure in the receiver tank.

5

10. The method of claim 6, wherein recovering refrigerant from the section of the refrigeration circuit during operation in the recovery cycle includes interrupting the flow of refrigerant through the second flow path and directing refrigerant through the first flow path.

10

11. A method of operating a temperature control unit, the temperature control unit including a refrigeration circuit enclosing a refrigerant and including a compressor, a condenser, and an evaporator coil, the method comprising:

15 providing a first flow path extending through the compressor, the condenser, and the evaporator;

providing a second flow path extending through the compressor and the evaporator, the second flow path bypassing a section of the refrigeration circuit;

directing refrigerant through the first flow path during operation in a cooling mode;

20 directing refrigerant through the second flow path during operation in a heating mode; and

interrupting the heating mode and removing refrigerant from the section of the refrigeration circuit.

25 12. The method of claim 11, wherein removing refrigerant from the section of the refrigeration circuit includes directing refrigerant through the first flow path.

13. The method of claim 11, wherein the refrigeration circuit includes a receiver tank, and wherein removing refrigerant from the section of the refrigeration circuit includes directing refrigerant through the first flow path to increase pressure in the receiver tank.

30

14. The method of claim 11, wherein the temperature control unit defines an air inlet and an air outlet and the method further comprises:

- providing an efficiency range;
- measuring an air inlet temperature;
- 5 measuring an air outlet temperature; and
- calculating a temperature change between the air inlet temperature and the air outlet temperature; and

wherein interrupting the heating mode and removing refrigerant from the section of the refrigeration circuit includes removing refrigerant from the section of the refrigeration circuit when the temperature change is outside the efficiency range.

15. A temperature control unit comprising:

- a refrigeration circuit having a refrigerant and including a compressor, a condenser, an evaporator coil, and a valve;
- 15 a first flow path extending through the compressor, the condenser, the evaporator, and the valve;
- a second flow path extending through the compressor, the evaporator, and the valve, the second flow path bypassing a section of the refrigeration circuit, the valve having a first orientation, in which refrigerant is directed along the first flow path, and a
- 20 second orientation, in which refrigerant is directed along the second flow path; and
- a controller in communication with the valve and operable to move the valve between the first orientation and the second orientation, the controller moving the valve toward the first orientation to remove refrigerant from the section of the refrigeration circuit during operation in a recovery cycle.

25

16. The temperature control unit of claim 15, further comprising:  
an air inlet and an air outlet, the evaporator coil being arranged between the  
air inlet and the air outlet;  
a first temperature sensor positioned adjacent to the air inlet to record an  
5 inlet temperature, the first temperature sensor being in communication with the controller;  
and  
a second temperature sensor positioned adjacent to the air outlet to record  
an outlet temperature, the second temperature sensor being in communication with the  
controller, the controller calculating a difference between the inlet temperature and the  
10 outlet temperature and initiating the recovery cycle when the difference between the inlet  
temperature and the outlet temperature is outside a predetermined range.
17. The temperature control apparatus of claim 15, wherein the temperature  
control apparatus is operable in a cooling mode and a heating mode, and wherein the  
15 controller moves the valve to the first orientation during operation in the cooling mode and  
moves the valve to the second orientation during operation in the heating mode.